LISTING OF THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

1.(Currently Amended) Optical metrology method for determining the three-dimensional topography of an orifice, in particular for the measurement of micrometric, tapered nozzles and other similar devices ~~(13)~~, using illuminated means ~~(1)~~ of the object to be analysed ~~(14)~~ and observation means ~~(2)~~ of the object to be analysed ~~(14)~~, which includes at least one camera ~~(11)~~, characterised in that it comprises an initial step for checking that the image plane (z) for said illumination means ~~(1)~~ coincides with the object plane for the observation means ~~(2)~~; the method further comprising the steps of:

- arranging the object to be analysed ~~(14)~~ on a microscope slide with the greater diameter opening facing the illumination means ~~(1)~~;

- centring one of the orifices ~~(13)~~ of the object to be analysed ~~(14)~~ in the field of view of the observation means ~~(2)~~;

- bringing into focus by means of wide-field illumination the smaller diameter opening of the orifice ~~(13)~~ to be analysed;

-measuring the diameter of the orifice as well as major defects such as the absence of an orifice or large-scale deformations;

-modifying the focus plane (z_i) of the inner part of the orifice ~~(13)~~ of the object ~~(14)~~ by changing it to another focus plane (z_{i+1});

- measuring the contour of the orifice ~~(13)~~ in the focus plane (z_{i+1}) in order to determine the inner topography of the orifice ~~(13)~~ by projecting a sequence of patterns and measuring the position of the points of the contour of the orifice ~~(13)~~ when the images of the projected pattern and their reflection on the inner walls of the orifice ~~(13)~~ are superimposed on the plane of the camera ~~(11)~~;

- repeating the above process for a number of planes (z_i... z_n) inside the orifice ~~(13)~~;

- processing the data for the contours measured in the different planes to obtain a three-dimensional geometrical representation of the inner topography of the orifice ~~(13)~~, as well as its characteristic parameters (maximum and minimum diameters of the orifice ~~(13)~~, slope of the wall of the orifice ~~(13)~~, deviations from nominal figure, position of the axis of the orifice ~~(13)~~, etc.).

2. (Currently Amended) Method as claimed in claim 1, ~~characterized in that~~ wherein said sequence of patterns are circular patterns of a given, increasing radius.

3. (Currently Amended) Method as claimed in claim 1, ~~characterized in that~~ wherein the points of the contour on the focus plane (z_i) are measured using a cylindrical coordinate system with a resolution of 360-720 points measured along the length of the contour of the orifice ~~(13)~~.

4. (Currently Amended) Method as claimed in claim 1, ~~characterized in that~~ wherein a series of images ranging from 10 to 25 in number is acquired in order to obtain the points measured along the contour of the orifice ~~(13)~~.

5. (Currently Amended) Method is claimed in claim 1, ~~characterized in that~~ wherein the spacing between focus planes (z_i) ranges from 1 to 10 μm.

6. (Currently Amended) Method as claimed in claim 1, ~~characterized in that~~ wherein the step of modifying the focus plane (z_i)of the object being analysed ~~(14)~~ by another focus plane (z_{i+1}) is repeated by a given number of times to obtain values in just as many focus planes (z_n) within the orifice ~~(13)~~ of the object ~~(14)~~, depending on the thickness of the object being analysed and the requirements of the analysis parameters.

7. (Currently Amended) Apparatus for determining three-dimensional topographies according to the method as claimed in ~~any of the preceding claims~~ claim1, wherein and in particular for measuring micrometric tapered nozzles and other, similar devices ~~(13)~~, the apparatus being characterized in that it comprises illumination means ~~(1)~~, observation means ~~(2)~~ and computer processing means ~~(3)~~, said illumination means ~~(1)~~ comprising a microscope objective ~~(4)~~ associated with said illumination means ~~(1)~~, a light source ~~(5)~~, a pattern representation system ~~(6)~~, an an optical system ~~(8)~~ associated with the illumination means ~~(1)~~; and said observation means ~~(2)~~ comprising a microscope objective ~~(9)~~ associated with the observation means ~~(2)~~, an optical system ~~(10)~~ associated with the observation means ~~(2)~~, and at least one camera ~~(11, 18)~~.

8. (Currently Amended) Apparatus as claimed in claim 7, ~~characterized in that~~ wherein it includes a mirror ~~(7)~~ that deviates the light emitted from said light source at a certain angle ~~(5)~~ towards said optical system ~~(8)~~.

9. (Currently Amended) Apparatus as claimed in claim 8, ~~characterized in that~~ wherein the angle of deviation of the light caused by the mirror ~~(7)~~ is 90°.

10. (Currently Amended) Apparatus as claimed in claim 7, ~~characterized in that~~ wherein the objective ~~(4)~~ associated with the illumination means ~~(1)~~ is an 100X magnification SLWD objective (super-long working distance), whereas the objective ~~(9)~~ associated with the observation means ~~(2)~~ is a 50X magnification SLWD objective (super-long working distance), said camera ~~(11)~~ being a 1/3" camera.

11. (Currently Amended) Apparatus as claimed in claim 7, ~~characterized in that~~ wherein said pattern representation system ~~(6)~~ is controlled by a computer ~~(12)~~ that forms part of said computer processing means ~~(3)~~ and allows to both visualise a wide-field illumination and to generate circular patterns of different diameters, said patterns being projected by means of said objective ~~(4)~~ with said optical system ~~(8)~~ inside the orifice ~~(13)~~ of the object being analysed ~~(14)~~.

12. (Currently Amended) Apparatus as claimed in claim 7, ~~characterized in that~~ wherein said pattern representation system is a liquid crystal microdisplay (LCD) ~~(6)~~.

13. (Currently Amended) Apparatus as claimed in claim 7, ~~characterized in that~~ wherein said pattern representation system is a liquid-crystal-on-silicon (LCOS) microdisplay ~~(16)~~, and also includes a light beam splitter ~~(17)~~.

14. (Currently Amended) Apparatus as claimed in claim 7, ~~characterized in that~~ wherein said light source ~~(5)~~ emits a broadband spectrum of light.

15. (Currently Amended) Apparatus as claimed in claim 7, ~~characterized in that~~ wherein said light source ~~(5)~~ is a laser and the pattern on the inner surface of the orifice is generated using a scanner.

16. (Currently Amended) Apparatus as claimed in claim 7, ~~characterized in that~~ wherein it includes an additional camera 918), said apparatus further including a light beam splitter ~~(17')~~.

17. (Currently Amended) Apparatus as claimed in claim 7, ~~characterized in that~~ wherein said camera or cameras ~~(11,18)~~ are CCD cameras.

18. (Currently Amended) Apparatus as claimed in claim 7, ~~characterized in that~~ wherein said camera or cameras ~~(11,18)~~ are CMOS cameras.